ARIZONA-NEW MEXICO MOUNTAINS

As its name suggests, the Arizona-New Mexico Mountains Ecoregion includes much of the mountainous terrain in Arizona and New Mexico, as well as a small piece of Texas. It covers more than 6 million acres in Arizona and contains most of the State's conifer forests (TNC 1999). Elevation ranges from about 4000 to 12,643 feet, averaging about 7050 feet. One of the most prominent features of the ecoregion is the Mogollon Rim, an escarpment that traverses nearly 200 miles across central Arizona from just southwest of Flagstaff to the White Mountains of eastern Arizona, and which defines much of the southern edge of the ecoregion. No less dramatic are the San Francisco Peaks near Flagstaff, which may be seen from more than 100 miles away, and Mount Baldy in the White Mountains of eastern Arizona. Annual precipitation varies from 11 to 30 inches, evenly divided between summer and winter. Average temperatures vary seasonally and along elevation gradients, with all of the ecoregion receiving some snowfall.

Vegetative communities found within the Arizona-New Mexico Ecoregion range from high elevation Tundra atop the San Francisco Peaks, to the Plains and Great Basin Grassland/ Desertscrub at the lowest elevations. Over half of the ecoregion is composed of Montane Conifer and Subalpine Conifer vegetative communities.

Historically, the Arizona–New Mexico Ecoregion was settled for domestic livestock ranching and small subsistence farming enterprises. Most of the private lands were homesteaded where water was available. Logging, primarily of ponderosa pine, began in the 1870s and 1880s with the harvest of railroad ties and other products primarily for construction of the transcontinental railroad. A large portion of the conifer forests are on federal lands, administered by the Coconino and Apache-Sitgreaves National Forests, as well as on lands of the White Mountain Apache Nation.

Currently, almost all of the public and State Trust lands are leased for grazing. Logging of saw timber on federal and tribal lands declined sharply in the 1990's, and has not recovered to date. Concerns over insect infestation and catastrophic wildfire events have resulted in an increased interest and planning for landscape-level removal of primarily small diameter trees to reduce fuel loads and promote forest health. Other enterprises in the area are centered on tourism and recreation.

The major urban area within the ecoregion is the City of Flagstaff in the western portion of the ecoregion, with a population of approximately 61,000. Numerous other small communities including Williams, Snowflake, Taylor, Eagar, and Springerville occur throughout the ecoregion. Show Low and Pinetop-Lakeside straddle the border between this ecoregion and Apache Highlands North. None of these communities can be considered urban although they are increasing in population as retirees, recreationists, and associated businesses move to the area.

As more people come to the area, there is an increased demand for recreational opportunity on public lands in the ecoregion. The increasing population leads to new demands on lands that were previously lightly impacted by man. Wildlands of the Arizona-New Mexico Ecoregion are used by the public for hiking, hunting, sightseeing, back-roading, birding, camping, fishing, and a whole assortment of other recreational and wildlife-oriented pursuits. Fragmentation due to

roads and new urban and rural development continues to be a problem for maintaining biodiversity. Of particular concern is the increased use of off-road vehicles, which are causing increased roads and increase vehicle use in all of the wildlands of the ecoregion.

While the impacts associated with human settlement are increasing throughout the ecoregion, most of the land remains in public ownership and is expected to continue so into the foreseeable future. This factor alone will allow healthy wildlife diversity to be preserved if planning and partnering with the State, federal, and tribal landowners are maximized. Land management responsibility in the Arizona-New Mexico Ecoregion is predominantly tribal or federal with interspersed State Trust lands. The northeastern portions of the ecoregion, consisting primarily of private and State Trust lands, have a checkerboard landownership pattern that increases the challenge of planning and implementation of a cohesive land management strategy. In this portion of the ecoregion, large parcels of land are being subdivided into smaller "ranchettes," resulting in further fragmentation and loss of habitat. Preservation of wildlife habitat, particularly for grassland species and protection of critical winter range for wild ungulates through easements, land use agreements, and the acquisition of private lands should be considered as a high priority.

The Arizona-New Mexico Ecoregion contains the headwaters of the Little Colorado, Blue, Black, Gila, and Verde rivers, as well as numerous manmade impoundments. These and other aquatic systems and their associated riparian habitat support a disproportionately high number of wildlife species. Water resources are already over-allocated such that conflicts are increasing between human uses and maintenance of biological diversity. Land and water management planning will be critical to maintenance of biological diversity in the of anticipated human population growth.

For an expanded description of each habitat type and characterization of statewide threats to each, see "Statewide Condition of Arizona's Terrestrial and Riparian/Aquatic Habitat Types (Element 2)." See Appendix O for scoring of all stressors in each habitat type. The descriptions provided do not attempt to depict conditions on sovereign tribal lands. The nature of these stressors in Arizona is presented more fully under "Stressors that Impact Wildlife and Wildlife Habitats (Element 3)."

Species of Greatest Conservation Need (Element 1)

For more information on these species, see "Conservation Actions to Address Stressors to SGCN (Elements 3, 4)." A complete list of species, including those of lower conservation priority and of undetermined vulnerability status can be found in Appendix H. For some species in Table 18, this part of their distribution may not represent a key area for conservation actions.

Table 18. Tier 1a and 1b SGCN associated with each habitat type in the Arizona-New Mexico Mountain Ecoregion.

		Grasslands		Woodlands/Forests							Aquatic & Riparian		
Scientific Name	Common Name	Plains & Great Basin Grassland	Subalpine Grassland	Interior Chaparral	Madrean Evergreen Woodland	Great Basin Conifer Woodland	Petran Montane Conifer Forest	Petran Subalpine Conifer Forest	Alpine Tundra	Human Dominated landscapes*	Streams/ Rivers	Wetlands/ Springs	Lakes/ Reservoirs
Amphibians													
Bufo microscaphus	Arizona Toad	X		X	X	X	X				X	X	
Rana blairi	Plains Leopard Frog	X											
Rana chiricahuensis	Chiricahua Leopard Frog	X			X	X	X				X	X	X
Rana pipiens	Northern Leopard Frog	X	X		X	X	X	X			X	X	X
Rana yavapaiensis	Lowland Leopard Frog			X	X	X	X				X	X	
Birds													
Accipiter gentilis atricapillus	Northern Goshawk		X	X	X	X	X	X	X	X	X	X	X
Aechmophorus clarkii	Clark's Grebe									X	X	X	X
Ammodramus savannarum perpallidus	Western Grasshopper Sparrow	X								X			
Anthus spragueii	Sprague's Pipit	X											
Ardea alba	Great Egret									X	X	X	X
Botaurus lentiginosus	American Bittern									X	X	X	X
Buteo regalis	Ferruginous Hawk	X	X							X			
Buteogallus anthracinus	Common Black-Hawk						X				X	X	X
Catharus ustulatus	Swainson's Thrush		X	X	X	X	X	X		X	X	X	
Ceryle alcyon	Belted Kingfisher									X	X	X	X
Charadrius alexandrinus nivosus	Western Snowy Plover									X	X		X
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo									X	X	X	X
Contopus cooperi	Olive-sided Flycatcher	X	X	X	X	X	X	X		X	X	X	X

Table 18. Tier 1a and 1b SGCN associated with each habitat type in the Arizona-New Mexico Mountain Ecoregion.

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Scientific Name	Common Name	Plains & Great Basin Grassland	Subalpine Grassland	Interior Chaparral	Madrean Evergreen Woodland	Great Basin Conifer Woodland	Petran Montane Conifer Forest	Petran Subalpine Conifer Forest	Alpine Tundra	Human Dominated landscapes*	Streams/ Rivers	Wetlands/ Springs	Lakes/ Reservoirs
Dumetella carolinensis	Gray Catbird										X	X	X
Egretta thula	Snowy Egret									X	X	X	X
Empidonax traillii extimus	Southwestern Willow Flycatcher		X							X	X	X	X
Falco peregrinus anatum	American Peregrine Falcon	X	X	X	X	X	X	X	X	X	X	X	X
Haliaeetus leucocephalus	Bald Eagle	X	X				X	X		X	X	X	X
Oreoscoptes montanus	Sage Thrasher	X				X				X			
Pandion haliaetus	Osprey									X	X	X	X
Picoides dorsalis	American Three-toed Woodpecker						X	X					
Pinicola enucleator	Pine Grosbeak						X	X	X				
Progne subis arboricola	Western Purple Martin						X			X	X		X
Sphyrapicus nuchalis	Red-naped Sapsucker			X	X	X	X	X		X	X	X	X
Strix occidentalis lucida	Mexican Spotted Owl			X	X	X	X	X			X	X	
Fishes													
Catostomus clarki	Desert Sucker										X		
Catostomus discobolus	Bluehead Sucker										X		X
Catostomus insignis	Sonora Sucker										X		
Catostomus latipinnis	Flannelmouth Sucker										X		
Catostomus sp.	Little Colorado Sucker										X		
Gila robusta	Roundtail Chub										X		
Lepidomeda vittata	Little Colorado Spinedace										X		

Table 18. Tier 1a and 1b SGCN associated with each habitat type in the Arizona-New Mexico Mountain Ecoregion.

		Grasslands		Woodlands/Forests							Aquatic & Riparian		
Scientific Name	Common Name	Plains & Great Basin Grassland	Subalpine Grassland	Interior Chaparral	Madrean Evergreen Woodland	Great Basin Conifer Woodland	Petran Montane Conifer Forest	Petran Subalpine Conifer Forest	Alpine Tundra	Human Dominated landscapes*	Streams/ Rivers	Wetlands/ Springs	Lakes/ Reservoirs
Oncorhynchus gilae apache	Apache (Arizona) Trout										X		X
Oncorhynchus gilae gilae	Gila Trout										X		
Rhinichthys osculus	Speckled Dace										X		
Tiaroga cobitis	Loach Minnow										X		
Crustaceans and Mollusks													
Anodonta californiensis	California Floater										X	X	X
Discus shimekii cockerelli	Cockerell's Striate Disc (Snail)						X	X	X				
Pyrgulopsis trivialis	Three Forks Springsnail											X	
Mammals													
Canis lupus baileyi	Mexican Gray Wolf		X	X	X	X	X	X					
Cynomys gunnisoni	Gunnison's Prairie Dog	X	X			X	X						
Euderma maculatum	Spotted Bat			X			X	X			X	X	X
Eumops perotis californicus	Greater Western Mastiff Bat						X						
Lasiurus blossevillii	Western Red Bat	X	X	X	X	X	X	X			X	X	
Microtus mexicanus hualpaiensis	Hualapai Mexican Vole					X	X						
Nyctinomops macrotis	Big Free-tailed Bat				X	X	X				X	X	X
Ovis canadensis mexicana	Desert Bighorn Sheep	X									X	X	
Perognathus flavus goodpasteri	Springerville Pocket Mouse	X											
Sorex nanus	Dwarf Shrew						X	X	X				
Sorex palustris	Water Shrew		X					X			X	X	

Table 18. Tier 1a and 1b SGCN associated with each habitat type in the Arizona-New Mexico Mountain Ecoregion.

		Grasslands		Woodlands/Forests							Aquatic & Riparian		
Scientific Name	Common Name	Plains & Great Basin Grassland	Subalpine Grassland	Interior Chaparral	Madrean Evergreen Woodland	Great Basin Conifer Woodland	Petran Montane Conifer Forest	Petran Subalpine Conifer Forest	Alpine Tundra	Human Dominated landscapes*	Streams/ Rivers	Wetlands/ Springs	Lakes/ Reservoirs
Spermophilus tridecemlineatus	Thirteen-lined Ground Squirrel		X						X				
Zapus hudsonius luteus	New Mexican Jumping Mouse										X	X	
Reptiles													
Thamnophis eques megalops	Northern Mexican Gartersnake										X	X	X
Thamnophis rufipunctatus	Narrow-headed Gartersnake										X		

*Human-dominated landscapes here refer to agricultural areas and urban lakes. These habitat types are discussed under "Statewide Condition of Arizona's Terrestrial and Aquatic/Riparian Habitat Types," and in "Stressors to Arizona's Wildlife and Wildlife Habitat" under the stressor "Urban/rural development."

Terrestrial habitat types below are arranged in order of prevalence in this ecoregion. Where patches of uncharacteristic habitat types (not described in this section) occur in this ecoregion, conservation should reflect stressors and species identified in neighboring ecoregions.

Montane Conifer Forest
(50.7% of acreage)

Habitat Condition (Element 2)

With over 3 million acres, stretching contiguously from west of Flagstaff east to the New Mexico border, this is the largest vegetative community in the ecoregion. Ponderosa pine is the dominant tree species, with some interspersion of Subalpine Conifer forest at higher elevations. Historically, these forests were characterized by a patchwork of stands with variable age structures, densities, and composition. Their current condition is considered degraded, largely due to homogenization of stands, dense growth, and lower species diversity. Though numerous private inholdings as well as cities and towns are interspersed throughout, most of this habitat is public land managed by the USFS, and has been subject to livestock grazing, timber harvest and the development of extensive road networks which were needed to access the timber. Catastrophic wildfire and insect infestation, exacerbated during periods of drought, are major threats to this vegetative community. Fuels reduction activities may also prove detrimental to

some forest species, as tree densities and canopy closure are reduced beyond tolerance levels, or may fail to allow the return of natural fire regimes in the face of fine fuels removal by continued high levels of livestock grazing.

This habitat type is impacted by stressors from a variety of sources. Active management is currently underway to address some identified stressors as described above. However, other stressors, such as those associated with burgeoning population growth locally and in the metropolitan areas of Phoenix and Tucson will continue to increase pressure on this habitat type. Many of the restoration activities currently underway are in early stages, so it is not yet clear whether the fuels reduction activities currently being taken to address unnatural fire regimes, for example, will prove sufficient, or may themselves become stressors in the future. In this example, it is not yet known if the development of a viable industry capable of utilizing small diameter wood and offsetting the substantial cost of these treatments will come to fruition and thus make practicable the treatment of a significant portion of this habitat type. If the scale of these operations is increased as planned, economic considerations may make it difficult to protect smaller, critical habitat components.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Changes in Ecological Processes**
- Altered river flow regimes
- Unnatural fire regimes
- Streambank alteration/channelization
- Loss of keystone species
- Insect Infestation
- Management for game animals and sport fish
- Habitat degradation/shrub invasions
- Habitat fragmentation/barriers

Stressor Category: **Climate Change**
- Drought

Stressor Category: **Consumptive use of biological resources**
- Grazing by ungulates
- Forest and woodland management - consumptive use

Stressor Category: **Habitat conversion**
- Livestock management
- Rural development
- Recreational sites/facilities

Stressor Category: **Invasive species**
- Nuisance plants
- Feral animals
- Disease/pathogens/parasites
- Nuisance animals

Stressor Category: **Non-consumptive resource use**
- Dispersed camping
- Motorized recreation off-trail

Stressor Category: **Pollution**
Highway/roadway de-icing
Illegal dumping/littering
Noise pollution
Stressor Category: **Transportation and infrastructure**
Power lines/wind-harnessing turbines
Roads for motorized vehicles
Unauthorized roads & trails

Great Basin Conifer Woodland
(31.7% of acreage)

Habitat Condition (Element 2)
This vegetative community is found at somewhat lower elevations than the Montane Conifer forest and typically on poorer soils at mid-elevations. Land management is primarily a mix of USFS, private and State Trust lands. This habitat type continues to degrade as tree densities continue to increase. With an increase in canopy closure, there has been a reduction in vegetative diversity including the critical browse and herbaceous vegetation components. Loss of ground cover has left many areas within this habitat type vulnerable to the effects of overland flows, and the dense canopies have become increasingly vulnerable to catastrophic fire, especially during periods of drought. This habitat type is also replacing grassland habitat types in many locales. This shift has occurred under the influences of heavy livestock grazing, unnatural fire regimes and a possible climate shift to warmer temperature. In addition, this habitat type is becoming increasingly vulnerable to fragmentation through rural development as once large tracts of land are subdivided, as wind power generation facilities are constructed, and as the network of roads continues to grow. Management of these habitats for wildlife requires balancing the needs of species dependent on the woodland type with the needs of grassland obligates in planning and prioritization of actions.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**
Drilling for fuels
Mining
Water diversion/water catchments
Stressor Category: **Changes in Ecological Processes**
Habitat fragmentation/barriers
Habitat degradation/shrub invasions
Management for game animals and sport fish
Soil erosion
Unnatural fire regimes
Insect Infestation
Streambank alteration/channelization
Stressor Category: **Climate Change**
Drought

Stressor Category: **Consumptive use of biological resources**
Grazing by ungulates
Forest and woodland management - consumptive use
Stressor Category: **Habitat conversion**
Livestock management
Urban growth
Rural development
Stressor Category: **Invasive species**
Disease/pathogens/parasites
Nuisance plants
Nuisance animals
Feral animals
Stressor Category: **Non-consumptive resource use**
Motorized recreation off-trail
Stressor Category: **Pollution**
Noise pollution
Sediment/ash flows
Illegal dumping/littering
Stressor Category: **Transportation and infrastructure**
Power lines/wind-harnessing turbines
Unauthorized roads & trails
Roads for motorized vehicles
Right-of-way fencing along roadways

Plains and Great Basin Grassland
(13.0% of acreage)

Habitat Condition (Element 2)
This vegetative community is found at somewhat lower elevations than Montane Conifer forest and typically on poorer soils at mid-elevations. These are the most important habitats for some of our pronghorn and other grassland species (for example, grassland birds). Land ownership is primarily a mix of USFS, private and State Trust lands. This habitat type continues to degrade in the face of impacts due to improper livestock grazing, encroachment by pinyon-juniper, and altered fire regimes. In addition, this habitat type is becoming increasingly vulnerable to fragmentation through rural development as once large tracts of land are subdivided, as wind power generation facilities are constructed, and as the network of roads continues to grow. It will be necessary to address these threats and to restore a natural fire regime to maintain the function of these grasslands and to reduce shrub invasion.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Changes in Ecological Processes**
Soil erosion
Unnatural fire regimes
Habitat degradation/shrub invasions

Habitat fragmentation/barriers

Stressor Category: **Climate Change**

Drought

Stressor Category: **Consumptive use of biological resources**

Grazing by ungulates

Stressor Category: **Habitat conversion**

Livestock management

Stressor Category: **Non-consumptive resource use**

Motorized recreation off-trail

Stressor Category: **Transportation and infrastructure**

Roads for motorized vehicles

Unauthorized roads & trails

Subalpine Conifer Forest
(2.0% of acreage)

Habitat Condition (Element 2)

The majority of this habitat type is found at higher elevations in the White Mountains and San Francisco Peaks. This community is also found in the canyons and drainages along the Mogollon Rim. It occurs interspersed with the Montane Conifer forest type at mid-elevations in canyons and on steeper, north-facing slopes of some hills where soil moisture is more abundant. These forests are currently considered degraded. Most of this habitat is public land managed by the USFS, and has been subject to fire suppression, livestock grazing, timber harvest and the development of extensive road networks, which were needed to access the timber and remain as aggravating factors. Drought-induced catastrophic wildfire and insect infestation, along with the continued loss of vegetative components such as aspen, and an increasing demand for recreational opportunities are major threats to this vegetative community.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**

Groundwater depletion and springhead use

Stressor Category: **Changes in Ecological Processes**

Altered river flow regimes

Streambank alteration/channelization

Management for game animals and sport fish

Loss of keystone species

Insect Infestation

Habitat fragmentation/barriers

Stressor Category: **Climate Change**

Drought

Stressor Category: **Consumptive use of biological resources**

Grazing by ungulates

Stressor Category: **Habitat conversion**

Recreational sites/facilities

Stressor Category: **Invasive species**
Nuisance plants
Stressor Category: **Non-consumptive resource use**
Motorized recreation off-trail
Dispersed camping
Stressor Category: **Pollution**
Noise pollution
Stressor Category: **Transportation and infrastructure**
Roads for motorized vehicles
Unauthorized roads & trails

Subalpine Grasslands
(0.9% of acreage)

Habitat Condition (Element 2)
This vegetative community occurs in the White Mountains in the eastern portion of the ecoregion. Most of this habitat is public land managed by the USFS. The condition of this habitat type is considered degraded, with encroachment by woody species and some areas showing excessive utilization of herbaceous forage by grazing ungulates, low plant vigor, insufficient ground cover, and displacement of native mesic species in moist bottom areas with nonnative species such as Kentucky bluegrass. Livestock grazing has been and continues to be the dominant land use. Continued heavy grazing within areas of this habitat type is impeding recovery. Due to the open nature of the landscape, creation of unauthorized roads is also of concern along with an increasing demand for recreational opportunities.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**
Water diversion/water catchments
Groundwater depletion and springhead use
Stressor Category: **Changes in Ecological Processes**
Management for game animals and sport fish
Habitat degradation/shrub invasions
Loss of keystone species
Altered river flow regimes
Stressor Category: **Climate Change**
Drought
Stressor Category: **Consumptive use of biological resources**
Grazing by ungulates
Stressor Category: **Habitat conversion**
Rural development
Recreational sites/facilities
Livestock management
Stressor Category: **Invasive species**
Nuisance plants

Nuisance animals
Disease/pathogens/parasites

Stressor Category: **Non-consumptive resource use**
Motorized recreation off-trail

Stressor Category: **Transportation and infrastructure**
Roads for motorized vehicles
Trails for foot, bike, or equine use
Unauthorized roads & trails

Interior Chaparral
(0.9% of acreage)

Habitat Condition (Element 2)
This habitat type is found primarily in Apache Highlands North, with some representation in this ecoregion. The following major stressors were assessed for this habitat type in Apache Highlands North.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**
Groundwater depletion and springhead use

Stressor Category: **Changes in Ecological Processes**
Habitat fragmentation/barriers
Unnatural fire regimes
Loss of keystone species
Soil erosion

Stressor Category: **Climate Change**
Shift to warmer climate
Drought

Stressor Category: **Consumptive use of biological resources**
Grazing by ungulates

Stressor Category: **Habitat conversion**
Rural development

Stressor Category: **Invasive species**
Nuisance animals
Nuisance plants

Stressor Category: **Pollution**
Contaminants from waste water and runoff

Stressor Category: **Transportation and infrastructure**
Roads for motorized vehicles
Telephone lines/cellphone towers
Power lines/wind-harnessing turbines

Great Basin Desertscrub
(0.6% of acreage)

Habitat Condition (Element 2)
This vegetative community within the Arizona-New Mexico Mountains Ecoregion is found primarily on the sovereign nations of the Navajo and Hopi tribal lands. Elsewhere, this habitat type has established itself in areas with poorer soils and in degraded sites that were originally in the Great Basin grassland and conifer forest communities. There is a tendency for the Plains and Great Basin grassland type to convert to Desertscrub and/or Great Basin Conifer Woodlands when subjected to the combined effects of heavy livestock use, unnatural fire regimes and generalized warming of the region's climate. When the Ecoregion Workgroup evaluated stressors for the Arizona-New Mexico Mountains, the Plains and Great Basin Grassland and Great Basin Desertscrub habitat types were combined due to the interspersion of the two and the commonality of the threats to each.

Major Stressors Affecting Habitat (Element 3)

SEE STRESSORS UNDER "PLAINS/GREAT BASIN GRASSLAND"

Madrean Evergreen Woodland
(0.18% of acreage)

Habitat Condition (Element 2)
This vegetative community occurs in the southeast-most portion of the ecoregion, along the Blue River. This habitat is public land managed by the USFS, and has been subject to livestock grazing. Past fire suppression, exacerbated by the current drought, has contributed to a downward trend in condition and an increased risk of catastrophic fire.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Changes in Ecological Processes**
Soil erosion
Unnatural fire regimes
Stressor Category: **Climate Change**
Drought
Stressor Category: **Consumptive use of biological resources**
Grazing by ungulates
Stressor Category: **Habitat conversion**
Livestock management

Alpine Tundra
(0.02% of acreage)

Habitat Condition (Element 2)
One small pocket of this vegetative community exists in Arizona, and it consists of less than 1400 acres atop the San Francisco Peaks near Flagstaff. The most important impacts on this habitat type are climate related: the shift to a warmer climate throughout the state and prevailing

drought conditions. Other influences are minor but important. These include trampling by hikers, and construction of unauthorized roads and trails by summer recreational use of the Arizona Snowbowl ski lift. The trend in this habitat type is to continued loss of species and populations of rare components of the tundra. Many of these influences are being actively managed by the USFS under strict rules which lack a significant enforcement effort due to restricted funding and the remote location at which tundra is found.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Climate Change**
Shift to warmer climate
Drought
Stressor Category: **Non-consumptive resource use**
Non-motorized recreation off-trail
Stressor Category: **Transportation and infrastructure**
Unauthorized roads & trails

Riparian and aquatic habitat types in the Arizona-New Mexico Mountains include:

Wetlands/Springs/Seeps

Habitat Condition (Element 2)
Although limited within certain regions of the Arizona-New Mexico Mountains, innumerable springs and seeps occur. All are critical to maintain due to the role they play in providing key habitat components to wildlife. Although a number of these wetlands, springs, and seeps have received some protection, primarily through fencing to eliminate use by livestock and occasionally elk, others remain highly degraded and continue to be subjected to the perturbations of grazing activities, including activities within the surrounding uplands. During periods of drought, reduction in flow or complete dewatering has occurred. Stressors described below reflect resulting changes in ecological process as well as impacts related to human population growth in this ecoregion and in neighboring metropolitan Phoenix.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**
Water diversion/water catchments
Groundwater depletion and springhead use
Stressor Category: **Changes in Ecological Processes**
Altered river flow regimes
Streambank alteration/channelization
Loss of keystone species
Unnatural fire regimes
Management for game animals and sport fish
Habitat degradation/shrub invasions
Habitat fragmentation/barriers

Stressor Category: **Climate Change**
Shift to warmer climate
Drought

Stressor Category: **Consumptive use of biological resources**
Grazing by ungulates
Harvesting/collecting animals

Stressor Category: **Habitat conversion**
Agricultural conversion
Rural development
Dams/reservoirs/impoundments
Livestock management
Urban growth

Stressor Category: **Invasive species**
Nuisance plants
Nuisance animals
Disease/pathogens/parasites
Feral animals

Stressor Category: **Non-consumptive resource use**
Dispersed camping
Non-motorized recreation off-trail
Motorized recreation off-trail

Stressor Category: **Pollution**
Nutrients/algal blooms
Sediment/ash flows
Pesticides/herbicides
Highway/roadway de-icing
Contaminants from waste water and runoff

Stressor Category: **Transportation and infrastructure**
Canals/pipelines
Unauthorized roads & trails
Dredging
Roads for motorized vehicles

Streams/Rivers

Habitat Condition (Element 2)

Rivers and streams in the Arizona-New Mexico Mountains include the headwaters of the Little Colorado River and most of its perennial tributaries, much of the Blue River and its tributaries, and the headwaters of the San Francisco, Black, White, and Verde rivers and their associated tributaries. All play a critical role in providing key habitat components to wildlife. Prior to European settlement of the ecoregion the rivers and streams which drained the area were largely unimpeded from their headwaters to their junction with the major rivers of which they are tributaries. Most, if not all of these streams, are now dammed or diverted throughout their course through the ecoregion. Most of this diversion has been for development of mining, municipal water supplies or agriculture. The trend in most of the ecoregion is toward more competition for

the available streamflows with water rights for wildlife (including instream flows and minimum pool) and wildlife habitats considered junior to other uses (municipal supplies, agriculture, etc.).

In the remaining streams and rivers, reduced flows due to water withdrawals, lowered water tables, and drought, as well as loss of riparian vegetation and occurrence of nonnative species continue to threaten streams and rivers within this ecoregion. Although many areas remain highly degraded and continue to degrade further, recent management actions, which have included modifying grazing practices and reducing sources of sedimentation have resulted in improved habitat conditions at those locations.

The listed major stressors elucidate the complexity of the situation.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**
- Mining
- Groundwater depletion and springhead use
- Water diversion/water catchments

Stressor Category: **Changes in Ecological Processes**
- Altered river flow regimes
- Habitat degradation/shrub invasions
- Loss of keystone species
- Domestication of wildlife/game farming
- Management for game animals and sport fish
- Habitat fragmentation/barriers
- Streambank alteration/channelization
- Unnatural fire regimes
- Soil erosion

Stressor Category: **Climate Change**
- Shift to warmer climate
- Drought

Stressor Category: **Consumptive use of biological resources**
- Grazing by ungulates

Stressor Category: **Habitat conversion**
- Dams/reservoirs/impoundments
- Livestock management
- Urban growth
- Rural development
- Recreational sites/facilities
- Agricultural conversion

Stressor Category: **Invasive species**
- Feral animals
- Bait-bucket dumping/illegal stocking
- Hybridization
- Nuisance animals

Nuisance plants
Disease/pathogens/parasites

Stressor Category: **Non-consumptive resource use**

Motorized recreation off-trail
Non-motorized recreation off-trail
Dispersed camping

Stressor Category: **Pollution**

Illegal dumping/littering
Lead shot/fishing line
Contaminants from waste water and runoff
Highway/roadway de-icing
Pesticides/herbicides
Noise pollution
Nutrients/algal blooms
Sediment/ash flows

Stressor Category: **Transportation and infrastructure**

Roads for motorized vehicles
Unauthorized roads & trails
Canals/pipelines
Trails for foot, bike, or equine use

Lakes/Reservoirs

Habitat Condition (Element 2)

Numerous small man-made lakes exist in the ecoregion, including Big Lake, Crescent Lake, Lee Valley Reservoir, Nelson Reservoir, Becker Lake, River Reservoir, Tunnel Reservoir, Bunch Reservoir, Rainbow Lake, Scott Reservoir, Show Low Lake, Fool Hollow Lake, Black Canyon Lake, Willow Springs Lake, Woods Canyon Lake, Chevelon Canyon Lake, Bear Canyon Lake, Knoll Lake, Blue Ridge Reservoir, Long Lake, Tremaine Lake, Soldier Lake, Soldier Annex Lake, Kinnikinick Lake, Ashurst Lake, Mormon Lake, Upper Lake Mary and Lower Lake Mary.

The lakes and reservoirs of the ecoregion are typically augmented natural depressions or impounded streams in the associated habitat types. These augmentations have been for the purpose of increasing domestic water supplies, providing livestock water, providing wildlife water and for recreation purposes. Many of the augmentations have been done strictly to supply water related recreation opportunity (for example, fishing and boating) and many have been constructed and maintained over the years by sportsmen's licenses and fees. The trend in condition in most of these is toward reduction in size due to concerns for dam and water control structure integrity. Competition with other uses for instream flows, water rights adjudications and other factors are limiting the number of new lakes and reservoirs being constructed in the ecoregion. Concerns for dam safety and budgetary constraints on funds for repairs/upgrades will serve to reduce the number of lakes and reservoirs in the future due to forced abandonment. Increased downstream demand for water tied to urbanization and population growth in Arizona will likely force release of impounded waters maintained by lesser water rights (in other words, for fisheries and recreation vs. city water supplies and agriculture).

Stressors described below reflect resulting changes in ecological process as well as impacts related to human population growth in this ecoregion and in neighboring metropolitan Phoenix.

Major Stressors Affecting Habitat (Element 3)

Stressor Category: **Abiotic resource use**
- Groundwater depletion and springhead use
- Water diversion/water catchments

Stressor Category: **Changes in Ecological Processes**
- Altered river flow regimes
- Streambank alteration/channelization
- Loss of keystone species
- Habitat degradation/shrub invasions
- Domestication of wildlife/game farming
- Unnatural fire regimes
- Management for game animals and sport fish

Stressor Category: **Climate Change**
- Drought
- Shift to warmer climate

Stressor Category: **Consumptive use of biological resources**
- Grazing by ungulates

Stressor Category: **Habitat conversion**
- Dams/reservoirs/impoundments
- Urban growth
- Agricultural conversion
- Rural development
- Recreational sites/facilities

Stressor Category: **Invasive species**
- Nuisance plants
- Nuisance animals
- Bait-bucket dumping/illegal stocking
- Disease/pathogens/parasites
- Feral animals

Stressor Category: **Non-consumptive resource use**
- Non-motorized recreation off-trail
- Dispersed camping
- Motorized recreation off-trail
- Watercraft operation

Stressor Category: **Pollution**
- Highway/roadway de-icing
- Nutrients/algal blooms
- Sediment/ash flows
- Pesticides/herbicides
- Contaminants from waste water and runoff

Heavy metals/mine tailings
Illegal dumping/littering
Noise pollution
Lead shot/fishing line

Stressor Category: **Transportation and infrastructure**

Dredging
Unauthorized roads & trails
Trails for foot, bike, or equine use
Canals/pipelines

Stressors that do not have habitat-level impacts in this ecoregion but may have large species-level impacts on specific SGCN in this ecoregion (Element 3)

In some cases, a stressor may have significant impacts to individual SGCN, but impacts are not felt throughout the habitat. Regardless of the extent of ecosystem-wide impacts, in any habitat type where these stressors act on SGCN, the appropriate conservation actions apply (see "Conservation Actions to Address Stressors to SGCN (Elements 3, 4)"). The following stressors do not have significant ecosystem-level impacts aquatic/riparian habitats in the Arizona-New Mexico Mountains, but where they act, they will negatively affect the associated SGCN where these species occur. Note that for wide-ranging species, impacts from some stressors may be quite significant, but may not act on the species throughout its range.

Stressors that rated high for these SGCN, but not for any of the habitats in the Arizona-New Mexico Mountains in which these species occur.			
Stressor Category	Stressor	Scientific Name	Common Name
Habitat conversion			
	Wetland filling for mosquito control		
		Ardea alba	Great Egret
		Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo
		Egretta thula	Snowy Egret